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Operation CASTLE

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PACIFIC PROVING GROUND
Spring of 1954



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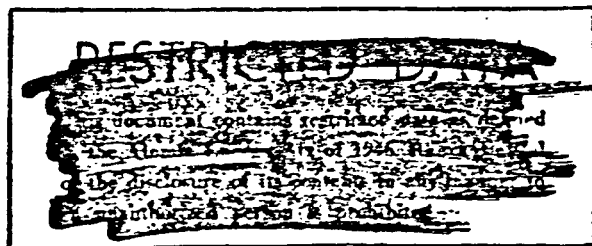
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REPORT OF THE MANAGER SANTA FE OPERATIONS



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FOREWORD

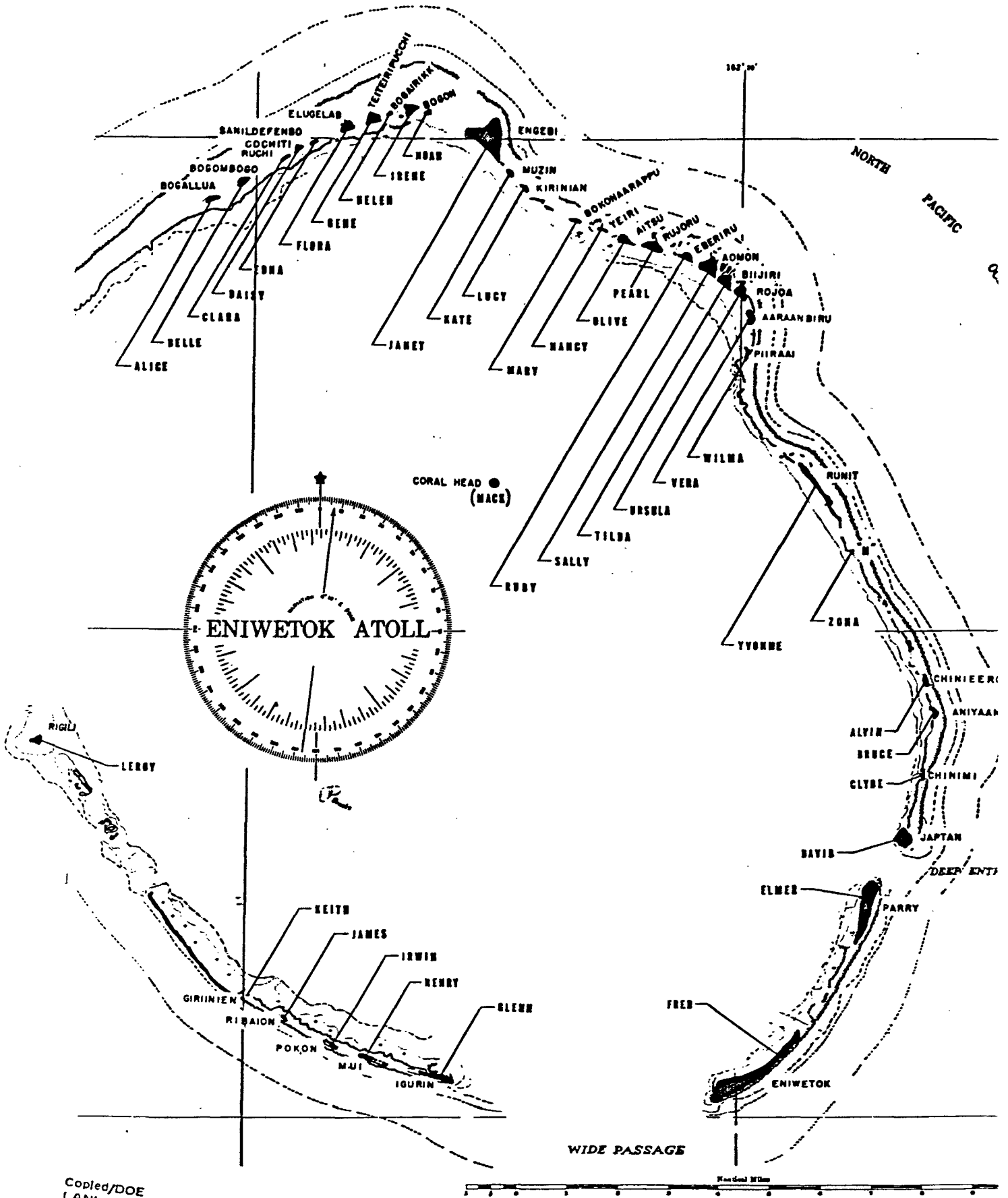
In the preparation of this report, cognizance has been taken of the reports of the Commander, Joint Task Force SEVEN to the Joint Chiefs of Staff pertaining to Operation CASTLE. Although the JTF reports are comprehensive in scope, it is believed that their composition is, in general, directed toward military and scientific channels of thought. In addition, the JTF reports are thought to lack pertinent information on certain AEC activities and costs useful in evaluating various aspects of an operation and in planning for future operations. Therefore, in order to derive maximum benefit from experience gained during an operation, it has been concluded that a supplemental report, embodying only that amount of technical detail essential to an understanding of results and with certain data presented in a manner conducive to useful analyses of proving ground development, would prove decidedly beneficial. This report attempts to achieve these aims in a manner as brief and concise as clarity will permit.

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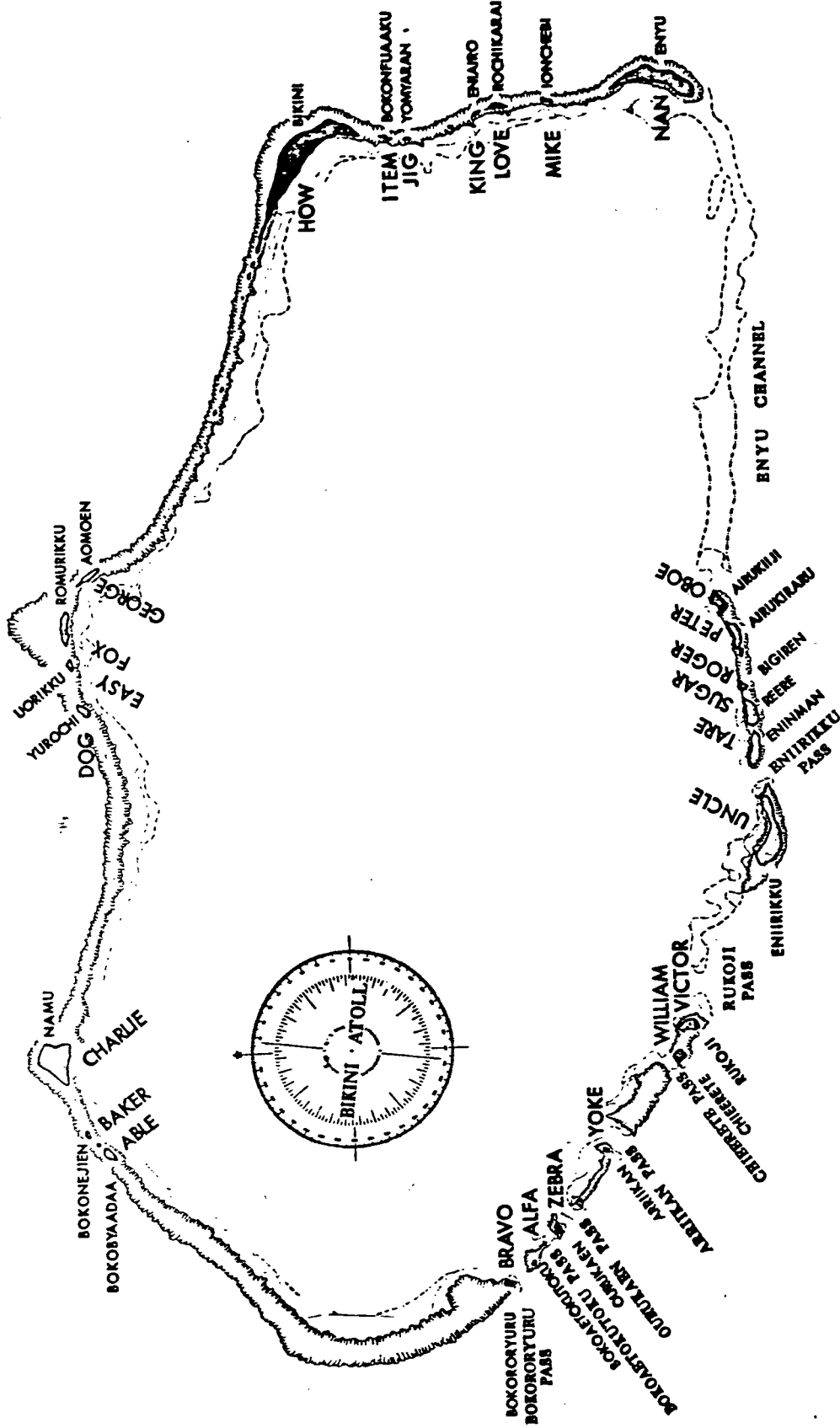
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INTRODUCTION

It is the primary purpose of this report to interpret and make record of test operation data and experience which will be of greatest use to those responsible for the continued maintenance and development of the proving ground. More specifically, the report has been compiled with a view toward its reference value to the Atomic Energy Commission. Although this report is supplemental in nature to the more comprehensive reports prepared by the Commander, Joint Task Force SEVEN for the Joint Chiefs of Staff, it is intended to be complete to the extent required in the satisfactory attainment of its aims.

The entire report is comprised of three principal parts. Part I presents a general over-all concept of the Operation from the AEC Santa Fe Operations point of view and includes recommendations for future operations; Part II is the scientific version of the Operation's aims and accomplishments as presented by the Los Alamos Scientific Laboratory (LASL) and the University of California Radiation Laboratory (UCRL); Part III presents the managerial or administrative aspects of the Operation. For a more comprehensive account of the LASL participation in the Operation, reference is made to the Report of the Commander, Task Group 7.1 for Operation CASTLE. Detailed coverage of the Contractor's activities may be found in the Completion Report for Operation CASTLE as prepared by Holmes & Narver, Inc.

PART I GENERAL ACCOUNT

CHAPTER 1. SUMMARY

1.1 OPERATION SITE

The Atomic Energy Commission's Pacific Proving Ground (PPG) comprises Eniwetok and Bikini Atolls in the Marshall Islands. Prior to the first CASTLE shot the water area surrounding these atolls and bounded by Lat. $12^{\circ} 45' N$ on the North, Long. $166^{\circ} 16' E$ on the East, Lat. $10^{\circ} 15' N$ on the South, and Long. $160^{\circ} 35' E$ on the West was established as a danger area, and unauthorized entrance by water or air was prohibited. The far-reaching fall-out effects occasioned by the first CASTLE shot prompted an immediate enlargement of the danger area for the balance of the Operation. The modified danger area is described as a circular segment centered at Lat. $12^{\circ} N$, Long. $164^{\circ} E$, with a radius of 450 nautical miles, and arc lengths extending from true bearings 240° to 95° in a clockwise direction. Figure 1 shows the proving ground and danger areas.

1.2 OPERATION SCOPE AND SCHEDULE

Operation CASTLE was a full-scale test operation developed by the Atomic Energy Commission (AEC) for testing nuclear devices and experimental

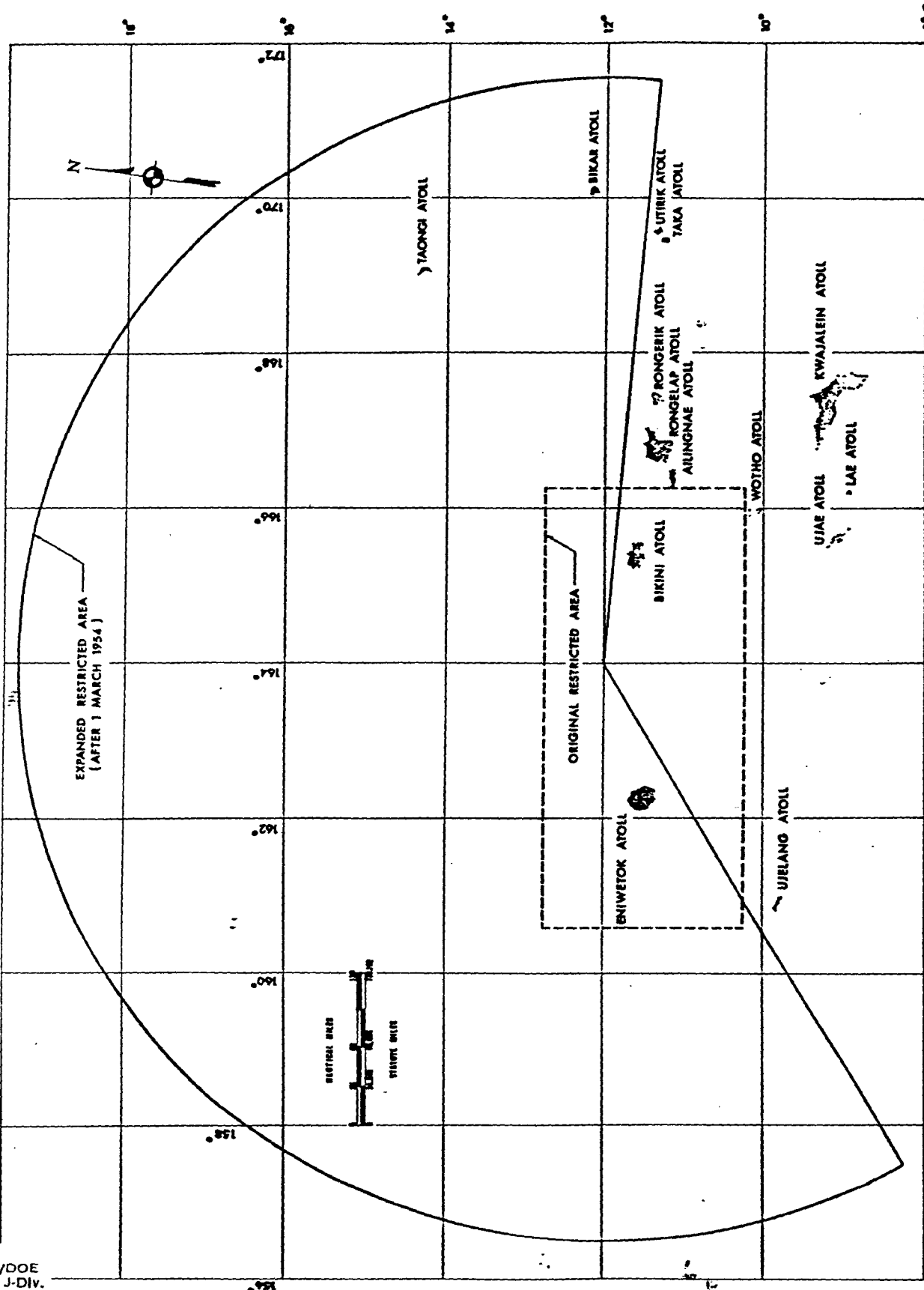


Figure 1. Restricted Area Chart

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weapons evolved in the Los Alamos Scientific Laboratory (LASL) and the University of California Radiation Laboratory (UCRL). In addition to extensive diagnostic experiment programs conducted by these laboratories, there was also included a program of weapons effects experiments sponsored by the Department of Defense (DOD). The final approved shot schedule is shown in Table 1. The number and sequence of shots as they actually occurred are shown in Table 2.

1.3 ORGANIZATION AND COMMAND RELATIONS

Ownership of all fixed installations at the PPG, except for several on Eniwetok Island, is in the AEC by purchase. Responsibility for the normal operation and maintenance of the proving ground rests with the Manager, Santa Fe Operations. This responsibility is delegated by the Manager, SFO, to the Field Manager, Eniwetok Field Office. The Field Office accomplishes the functions of engineering, design, construction, camp operation and maintenance through a single contractor, Holmes & Narver, Inc. In turn, these responsibilities are temporarily assumed by the Commander, TG 7.5 during active periods of that group.

Subsequent to Operation SANDSTONE, the AEC recommended to the DOD the establishment of a permanent test organization to conduct tests outside the United States. Initially, the Joint Chiefs of Staff (JCS) decided that successive Joint Task Forces for the conduct of overseas operations would be established as required. Due to the method of implementation, this directive essentially satisfied the AEC requirement for a continuing organization since it developed that succeeding Task Forces were activated prior to the deactivation of their predecessors. With the establishment of JTF 7 for Operation CASTLE, however, the concept of designating a new Task Force for each pending overseas operation was abandoned in favor of a permanent Joint Task Force.

Under agreement between the AEC and the DOD, Operation CASTLE was conducted by Joint Task Force SEVEN (JTF 7). By direction of the Joint Chiefs of Staff (JCS), the Task Force was placed under the Command of Major General P. W. Clarkson, U.S.A.

The Task Force was comprised of the Commander and his staff and five Task Groups:

- Task Group 7.1 - Scientific
- Task Group 7.2 - Army
- Task Group 7.3 - Navy
- Task Group 7.4 - Air Force
- Task Group 7.5 - AEC (Base Facilities)

In approving the establishment of a permanent Joint Task Force organization for support and execution of AEC full-scale tests at the PPG, the JCS

TABLE 1. FINAL APPROVED SHOT SCHEDULE

Shot No.	Code	Model	Date	Site	Megaton Yield (Presumed Range)	Remarks
1	BRAVO		1 Mar	Bikini. On reef 2950' bearing 250° true from SW tip of Namu.		
2	UNION		11 Mar	Bikini. Intersection of arcs with radii of 6900' from Yurochi & 3 nautical miles from Aomeon. Barge.		
3	YANKEE		22 Mar	Bikini. REDACTED Barge. REDACTED		
4	ECHO	DELETED	29 Mar	Eniwetok. Eberiru.	(6)	
5	NECTAR		5 Apr	Bikini. REDACTED REDACTED		
6	ROMEO		15 Apr	Bikini. REDACTED REDACTED		
7	KOON		22 Apr	Bikini. Eninman.		

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TABLE 2. ACTUAL SHOT SCHEDULE

<u>Shot No.</u>	<u>Code</u>	<u>Model</u>	<u>Date</u>	<u>Site</u>	<u>Megaton Yield (Presumed Range)</u> ¹	<u>Remarks</u>
1	BRAVO		1 Mar	Bikini. On reef 2950' bearing 250° true from SW tip of Namu. (4-8)	6	
2	ROMEO		27 Mar	Bikini. DELETED Barge. (1.5-15)	8	DELETED
3	KOON	DELETED	7 Apr	Bikini. Eninman.	1.5 (0.33-4)	
4	UNION		26 Apr	Bikini. Intersection of arcs with radii of 6900' from Yurochi and 3 nautical miles from Aomoen. Barge.	5-10 (1-18)	
5	YANKEE		5 May	Bikini. DELETED Barge. (7.5-15)	9.5	DELETED
6	NECTAR		14 May	Eniwetok. MIKE ² crater. Barge.	2-3 (1-5)	

1. Latest revised estimates of yield prior to actual detonation.

2. I.V.V. thermonuclear shot.

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specifically charged the Commander with:

1. Technical responsibility for all phases of the Operation.
2. The safety of personnel and units assigned to the JTF.
3. Advising the appropriate Commanders under the JCS of the special hazards and danger areas involved in tests and appropriate precautions to insure the safety of units other than the JTF.
4. Acting as agent for the AEC for the exercise of such functions on behalf of the Commission as the latter may deem necessary.

On 15 December 1953, the AEC withdrew from the Manager, Santa Fe Operations Office (SFOO) and assigned to the CJTF 7 full authority to act for the Commission in all matters which concerned the successful execution of the Task Force Operation Plan. It should be noted, however, that the CASTLE construction program was about 85% complete at this time. The 15 December date also marked the beginning of the CASTLE operational period which continued until 2 June 1954, at which time all AEC vested authority was relinquished by the CJTF 7. During periods between operations the authority of the CJTF, insofar as AEC functions are concerned, is limited to operational planning and coordination. Organizational and command relations in effect both prior to and during the operational period are depicted on Figure 2 and Figure 3 respectively.

1.4 GENERAL ACTIVITIES OF TASK GROUP 7.5

In off-continent test operations prior to CASTLE, the AEC functions of engineering design, construction, operations and support have been performed by a Task Unit within the organizational structure of the Scientific Task Group. In order that the responsibilities for AEC functions might be more clearly identified and the position of the AEC in the Task Force organization more positively established, it was recommended that the AEC component of the Task Force be given Task Group status. On 26 February 1953, the Director, Division of Military Application (DMA), AEC, formally requested the CJTF 7 to organize the AEC Base Facilities Task Group. In making this request, the DMA accepted certain conditions, among which was the requirement that the CJTF, in accomplishment of his scientific mission, would control and direct the activities of the Scientific and Base Facilities Task Groups through his Scientific Deputy. Task Group 7.5 was formally activated on 4 March 1953.

The mission of Task Group 7.5 is to:

1. Provide all base facilities at the Pacific Proving Ground necessary to the Task Force and AEC and its contractors in the conduct of test operations.

- [REDACTED]**
2. Provide all structures and related facilities required by the Scientific Task Group for the successful execution of the scientific experiments.
 3. Provide personnel, equipment and materials to support the Scientific Task Group in its on-site operational activities.
 4. Maintain all base facilities at the Pacific Proving Ground except for the military communications facilities at Eniwetok Island and Bikini Atoll.
 5. Provide camp and support facilities at the proving ground, including housing, feeding, laundry, medical, recreational and other camp services on all islands except Eniwetok; land transportation and motor pool operation; boat pool operation; utilities operations except military communication facilities on Eniwetok Island and Bikini Atoll and the POL farm on Eniwetok Island; and warehousing and property accounting for Task Groups 7.5 and 7.1, as requested.
 6. Provide for radiological safety of TG 7.1 and 7.5 personnel in periods between operations.
 7. Formulate and operate a comprehensive security program to cover AEC interest during non-operational periods, and during operations to provide at the proving ground security servicing for AEC, AEC contractor components, and TG 7.1, in coordination with the staff of JTF SEVEN and AEC, Washington.

The Task Group 7.5 headquarters organization was comprised of personnel assigned from various offices and divisions of the SFOO and certain key men of Holmes & Narver, Inc. For Operation CASTLE, Task Group 7.5 was organized along military lines. Staff positions were filled by AEC personnel, and the line organization closely followed the normal organizational pattern of the Contractor and was completely manned by Holmes & Narver employees. Coincident with the transfer of AEC authority to the CJTF 7, TG 7.5 became operational and the regular duties of its personnel were adapted to Task Group functions. Upon termination of the operational period these people reverted to their normal duties, and concluding operational activities of the Task Group were handled through AEC channels. For Operation CASTLE, the Commander, TG 7.5, was the Director, Office of Test Operations, SFO, and his deputy was the Field Manager, Eniwetok Field Office, SFO. A chart of TG 7.5 organization for CASTLE is depicted on Figure 4.

A statement of functions assigned to TG 7.5 is attached as Appendix A.

ORGANIZATION FOR CASTLE
PRE-OPERATIONAL PHASE
ATOMIC ENERGY COMMISSION - JOINT TASK FORCE SEVEN

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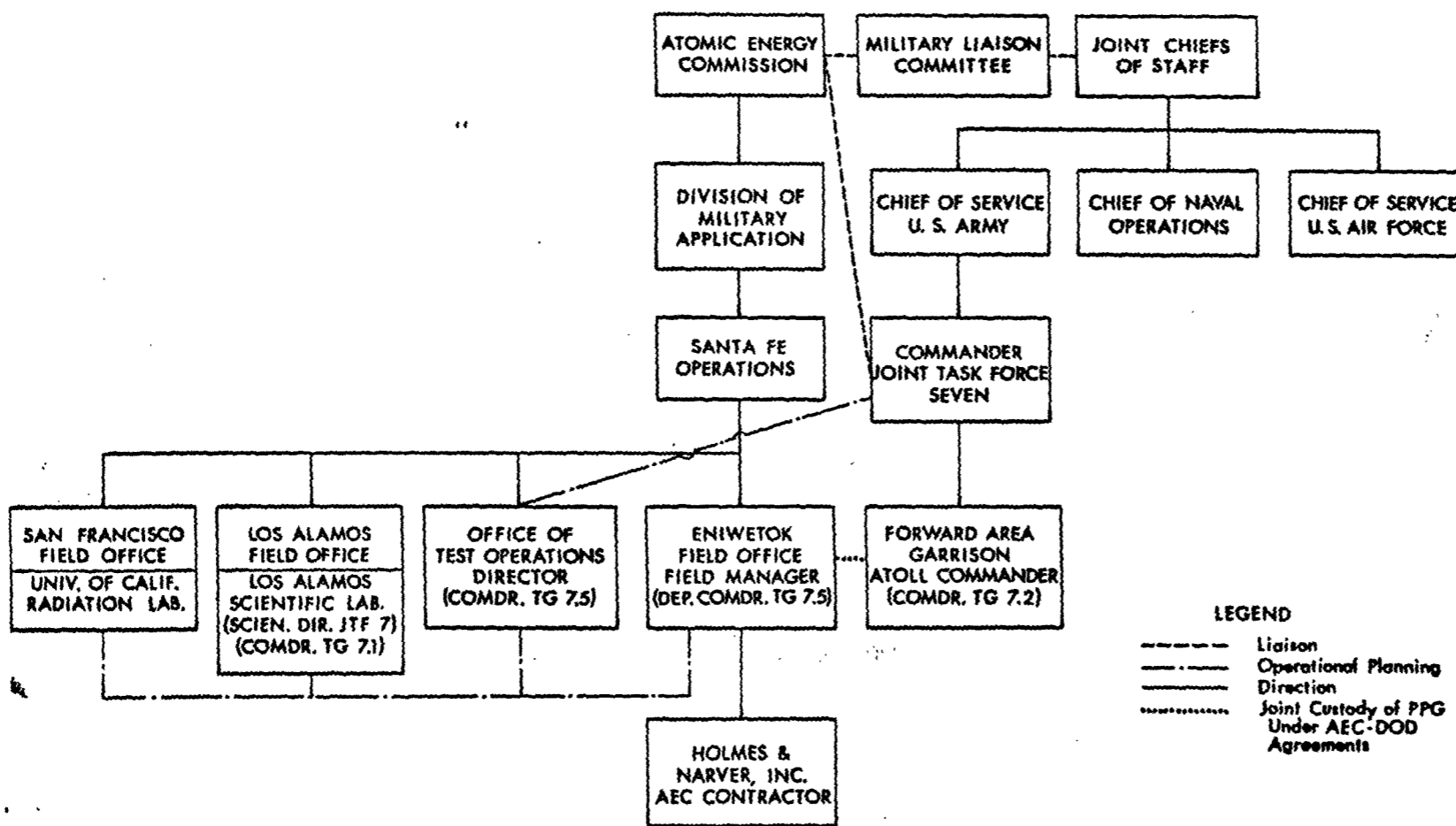


Figure 2

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1.5 PARTICIPATING AGENCIES

Agencies which were allocated scientific stations are as follows:

- 1. AFOAT-1 Air Force Office of Atomic Energy
- 2. BRL Ballistics Research Laboratory
- 3. CRL Chemical and Radiological Laboratory
- 4. DIRX Director Office Special Assignment
- 5. EG&G Edgerton, Germeshausen and Grier, Inc.
- 6. ESL Evans Signal Laboratory
- 7. LASL Los Alamos Scientific Laboratory
- 8. NRDL Naval Radiological Defense Laboratory
- 9. NRL Naval Research Laboratory
- 10. NRLS Naval Research Laboratory - Stewart
- 11. NOL Naval Ordnance Laboratory
- 12. ONR Office of Naval Research
- 13. SANDIA Sandia Corporation
- 14. SRI Stanford Research Institute
- 15. UCRL University of California Radiation Laboratory
- 16. USFS United States Forest Service
- 17. WADC Wright Air Development Center

In addition, there were several agencies that participated in or contributed to the various programs, and which were given support services; these are listed below:

- 18. ACC Army Chemical Corps
- 19. ACF American Car Foundry
- 20. AFL Applied Fisheries Laboratory, University of Washington
- 21. AFSWP Armed Forces Special Weapons Project
- 22. ARDC Air Research and Development Center
- 23. CAMCO Cambridge Corporation
- 24. DBM Division of Biology and Medicine, AEC
- 25. DOD Department of Defense
- 26. DTMB David Taylor Model Basin
- 27. HLJ Herrick L. Johnston
- 28. LML Lookout Mountain Laboratory
- 29. NEL Naval Electronics Laboratory
- 30. SAC Strategic Air Command
- 31. SCRIPPS Scripps Institute of Oceanography
- 32. USCGS United States Coast and Geodetic Survey
- 33. WPD Weapons Performance Division



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ORGANIZATION CHART, TASK GROUP - 7.5

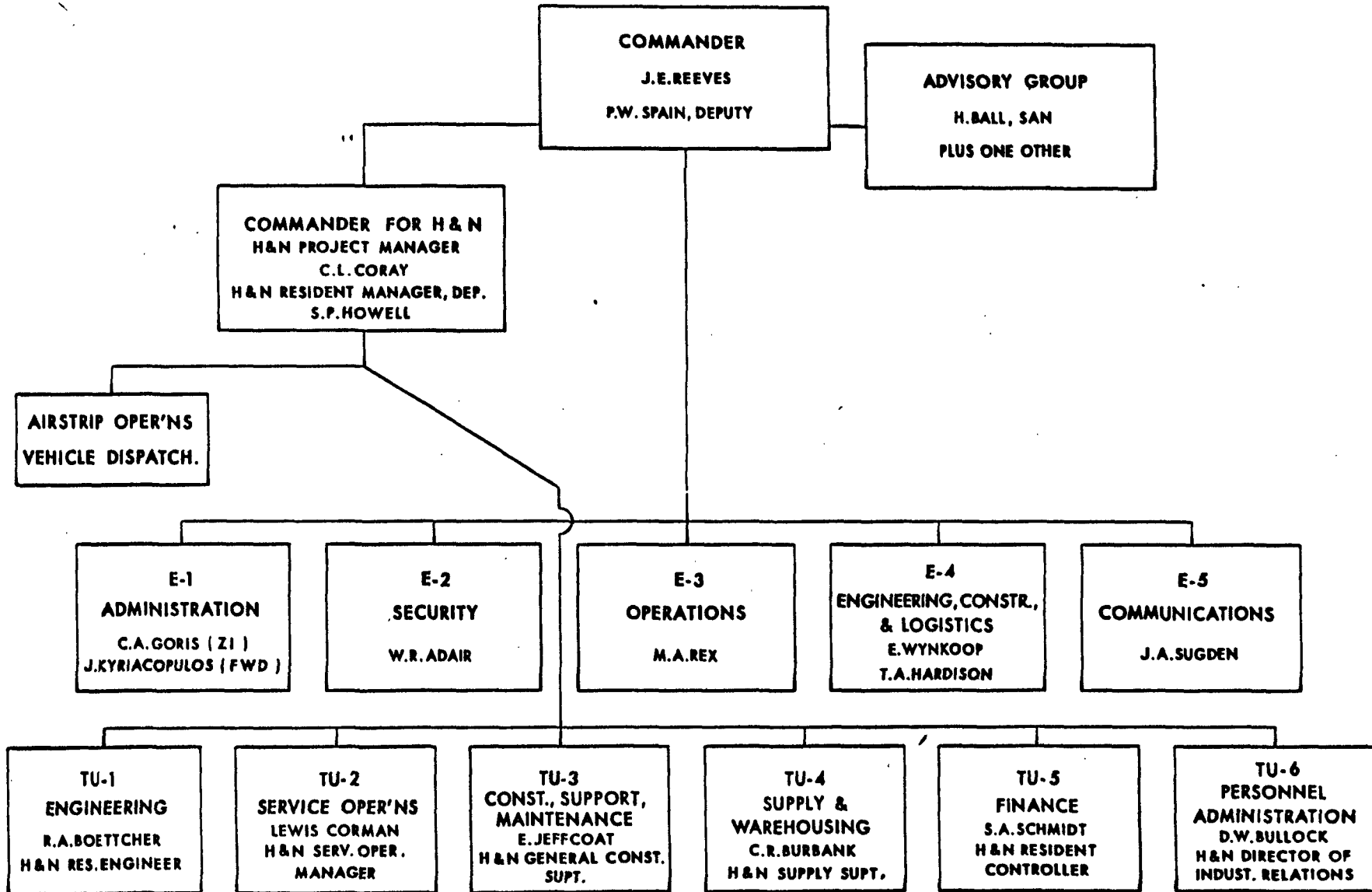


Figure 4

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1.6 SIGNIFICANT EVENTS

Several times in the past, criticism has been directed at what was considered to be an unnecessary lag in the reduction of the labor force as an operational period advanced. Such criticism can usually be traced to sources only distantly familiar with the peculiar demands of a test operation. To substantiate this view, a summary description of the BRAVO fall-out effects and their impact upon the Contractor's organization has been included in this report. For a more comprehensive coverage of the incident, reference is made to the report of Holmes & Narver, Inc. for Operation CASTLE.

On 1 March 1954, at 0645 hours, BRAVO was fired upon an artificial island between Namu and Bokonejien Islands at Bikini Atoll. The decision to fire was based on a predicted surface radex that showed no fall-out on inhabited islands that was significant from a health hazard standpoint. Therefore, on the basis of information available immediately prior to BRAVO, no significant fall-out was expected on inhabited areas and, consequently, it was not considered necessary to evacuate natives from neighboring atolls. However, an emergency plan for such an evacuation was prepared prior to the detonation and put into effect after the detonation.

At Rongerik Atoll a detachment of 28 USAF weather personnel were evacuated by aircraft. Evacuation was completed by 1800 hours on 2 March. The highest dosage received was one film badge at 98 roentgens (R) which represented three people living in a tent. Four badges representing the remainder of personnel living in metal barracks read 40 R, 40 R, 44 R and 52 R. The ground station at Rongerik began reading about 100 milliroentgens (MR) at 1400 hours on 1 March.

At Rongelap Atoll, 65 natives were evacuated by ship. Evacuation was completed by 1000 hours on 3 March. The average total dose was computed to have been approximately 100 R. The surface readings at Rongelap at 1830 hours on 2 March were reported as 1.4 R per hour average. An additional 17 natives visiting the neighboring Alinginae Atoll were also evacuated at this time. Their dosage was computed to have been approximately 74 R.

At Utirik Atoll, 154 natives were evacuated by ship. Evacuation was completed by 1245 hours on 4 March. The average total dose was computed to have been approximately 17 R. The surface readings at Utirik at 1345 hours on 3 March were reported as 160 MR per hour.

Evacuation proceedings were completed within 78 hours after the BRAVO detonation and all of the native evacuees were taken to Kwajalein and placed under the care and supervision of COMNAVSTAKWAJALEIN. The Rongelap natives were subsequently transferred to Majuro Atoll where it is anticipated they will remain for approximately one year before returning to Rongelap. Temporary living facilities, costing about \$50,000., were constructed at Majuro Atoll by Holmes & Narver forces for the accommodation of the displaced natives as shown in Figures 5, 6 and 7. Return of the Utirik natives

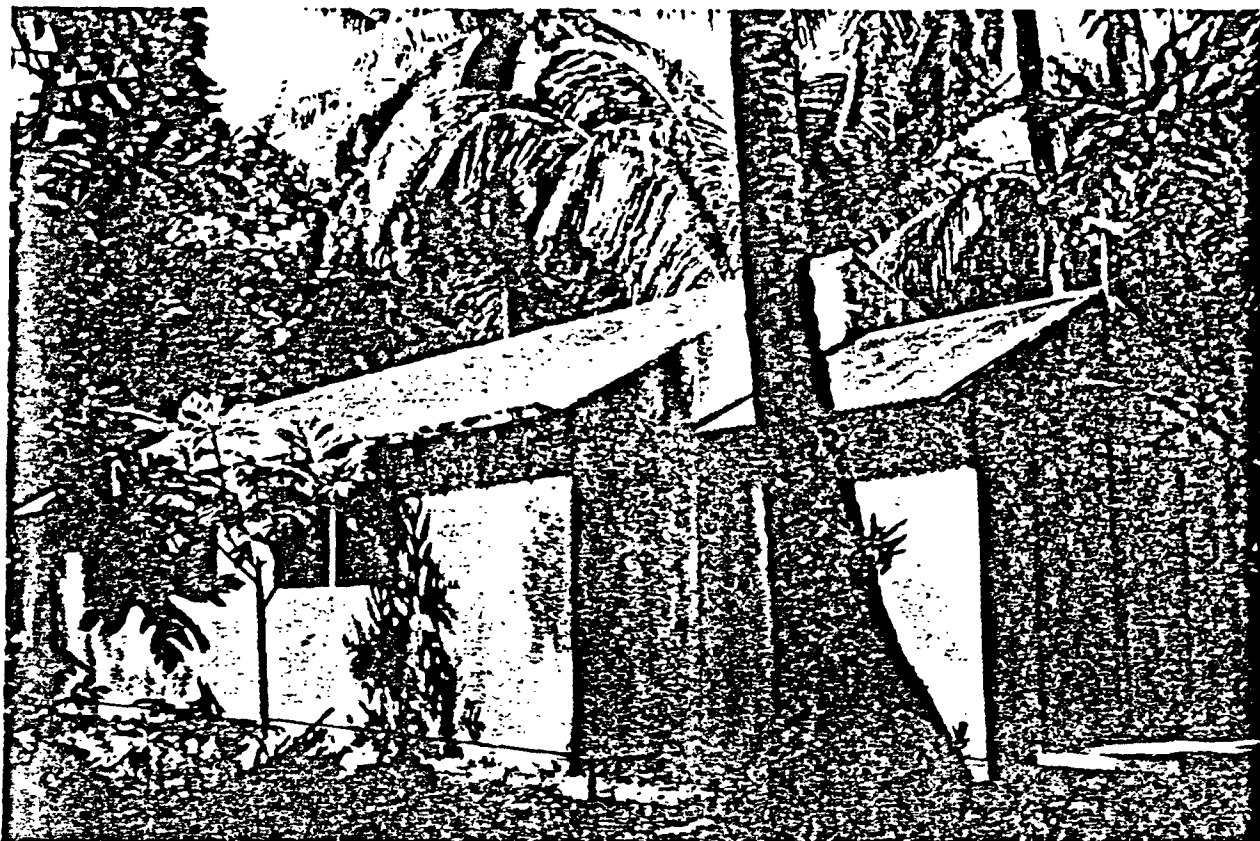
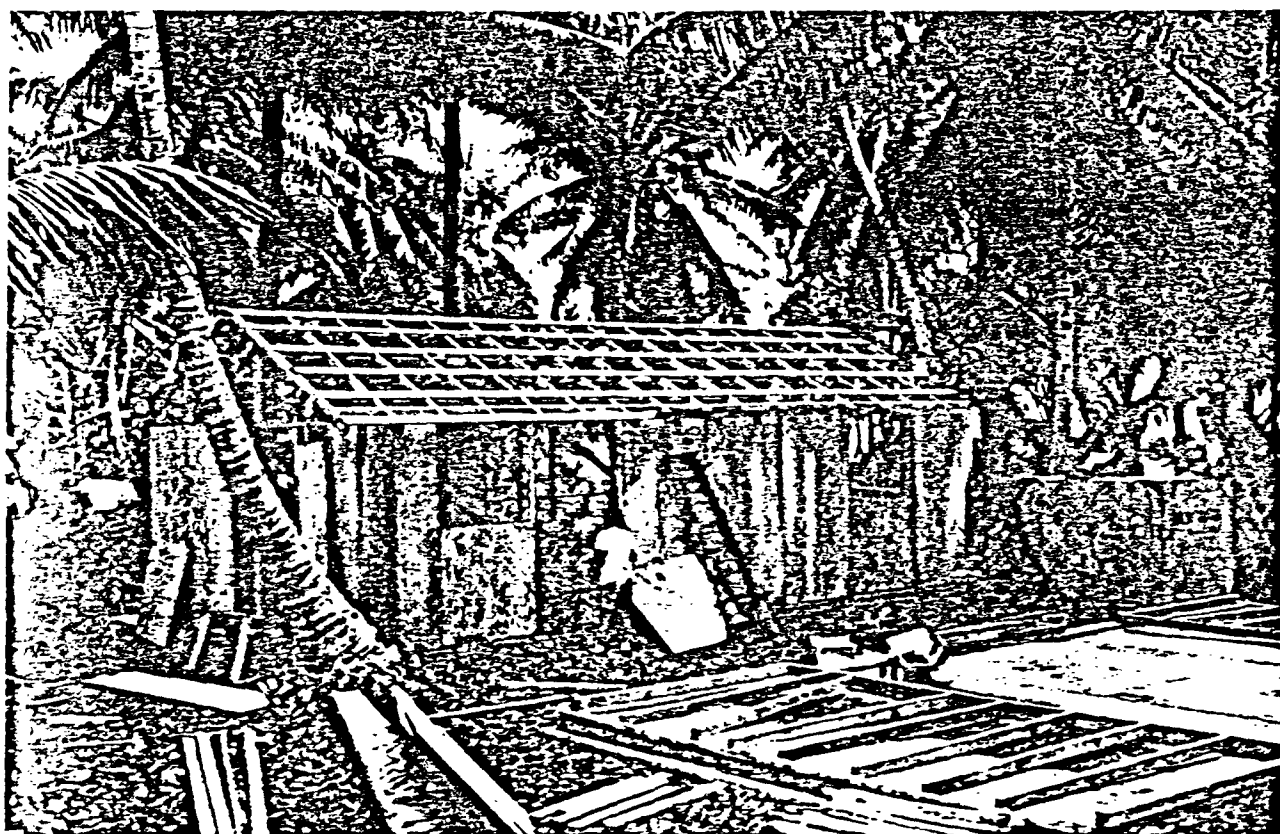


Figure 5. Combination Church and School Building, Ejit Island

Figure 6. Framing for Typical Dwelling, Ejit Island



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on Parry Island. TG 7.3 personnel remained afloat. A considerable amount of effort was required of the Contractor in order to properly feed, clothe, and house this sudden population influx at Parry. Recreation centers and beach buildings were converted into emergency housing; mess hall schedules were changed and Post Exchange operations enlarged to permit replenishment of lost or abandoned personal articles. It is the opinion of the SFOO that in successfully overcoming the many unforeseen demands placed upon his organization, the Contractor exercised a commendable degree of foresight, ability and good judgement. The geographical relation of evacuated atolls with Bikini and Kwajalein is depicted in Figure 1.

CHAPTER 2. COMMENTS AND RECOMMENDATIONS

2.1 COMMENTARY

As previously indicated in paragraph 1.4, the managerial functions for off-continent test operations prior to Operation CASTLE were performed by the AEC in the capacity of a Task Unit within the Scientific Task Group of the Task Force organization. As may be surmised, it was not possible from such a subordinate level for the AEC to exercise the prerogatives to which it was entitled as the employer of the LASL and principal financial contributor to the cost of test operations. Being firmly convinced that broader AEC participation in the actual conduct of overseas test operations would aid materially in the planning and execution of support activities, the Santa Fe Operations Office recommended that the Task Force be augmented by a Base Facilities Task Group for Operation CASTLE. The recommendation was approved and, based on CASTLE experience, it is the opinion of the SFOO that this arrangement was superior to the previous organization.

The long-range communication facilities at Eniwetok Island were seriously hampered by overcrowding, resulting in interference from motors, arc welders, aircraft operation, and interference between transmit and receive signals due to lack of physical separation of the equipment. Present plans for improving communications includes separation of the transmit and receive facilities by moving the transmitters to some other island within the atoll, moving of receivers to the present transmitter site, and installation of microwave or an equal to interconnect transmitters and receivers. If the separate island concept is adopted, it is planned to allow for transmissions from Eniwetok Island during interim periods and activation of the principal transmitter site during operational phases only. This plan is both feasible and desirable due to the limited number of operating circuits during interim periods and the substantial reduction in support requirements which would result therefrom as compared to operating a transmitter on a separate island on a year-around basis. Improved communications between Eniwetok and Bikini Atolls during afloat operations is highly important. The USS ESTES was extremely overcrowded from a communications standpoint and interference was the rule rather than the exception.



There were two principal types of visitors to the proving ground during Operation CASTLE, the first being the Official Visitor Group, which consisted of approximately 20 people, ten each selected by the AEC and the DOD. Obviously, the requirements for participation in this group were: (1) A high-level individual, either civilian or military, engaged in some phase of the Atomic Weapon Program, (2) The individual had a definite need to know the over-all program, (3) The individual was Queen cleared. The second group, Participant Observers, was established primarily to satisfy the needs of SWC (Special Weapons Command) and SAC (Strategic Air Command) in allowing certain of their key personnel to witness a shot. In addition there were visits by representatives of SFOO and AEC Washington in a semi-work status. Many of these visitors (all categories) arrived at the proving ground aboard Special Air Mission flights but did not return with the same flight. Others arrived aboard regular MATS flights. In the handling of these visitors, TG 7.5 was made responsible for all AEC people (except VIP's) who did not come and go via the same SAM flight. Since the number of visitors of this kind and their plans were not known in advance of their actual arrival, TG 7.5 found itself somewhat handicapped in arranging the necessary accommodations and catering to their wishes. It was noted, too, that the standing of official visitors during CASTLE was, in many instances, below the standard contemplated when the visitor program was established. Since the on-site briefings approached a Top Secret classification, the conclusion is that many people received information as members of a visitor group which was far above a level which could be justified on a need-to-know basis.

2.2 RECOMMENDATIONS

In connection with Task Force organization, it should be noted that, although the operational phase was changed completely immediately after the first detonation, the rapid solution of the resulting problems indicated that the organization was quite satisfactory in its flexibility. It is thought, however, that TG 7.5 should provide more extensive assistance to TG 7.1 in the fields of administration, planning and support. By relieving both the LASL and the UCRL of a maximum amount of non-scientific functions, it is believed that these tasks could be combined in such a way as to effect some economy in personnel strength and minimize opportunities for conflicting procedures. It is contemplated, therefore, that the SFOO will, with the assistance of Holmes & Narver and appropriate Laboratory elements, undertake further study of administration, planning, and support functions for TG 7.1 and TG 7.5 prior to the next off-continent test operation.

In connection with overcrowding of long-range communication facilities, both ashore and afloat, it is recommended that appropriate Task Force and Task Group elements and SFOO communications personnel make a joint study of existing conditions with a view toward submitting their recommendations for improvement thereto well in advance of the next operational period at the PPG.



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In line with the comments made on the visitor problem, it is recommended that appropriate JTF personnel attempt to devise a method of advance notice whereby TG 7.5 can be better prepared to handle this requirement. In conjunction, it is also recommended that the Commission review the matter of official visitors being present without a need-to-know justification.

It is believed that Operation CASTLE has clearly indicated the desirability of establishing a Rad-Safe unit within TG 7.5 which would be readily susceptible to integration with the Rad-Safe organization of the Scientific Task Group during operation periods but which would still retain responsibility for the actions of TG 7.5 personnel. Therefore, the Field Manager, EFO, will explore with the appropriate JTF element the possibility of maintaining the Field Manager's Rad-Safe group as a unit within the Task Force Rad-Safe organization; this unit will continue in future test operations with the responsibility of TG 7.5 Rad-Safe activities, including the maintenance of records. In this connection it is intended that field supervisory personnel of the Contractor would be trained to do their own monitoring and "policing" of Contractor's personnel so that special monitors would not be required by TG 7.5 working parties.

It is the opinion of the SFOO that public acceptance of the Operation was again handicapped by an unrealistic public relations policy. Accordingly, it is recommended that public relations aspects of full-scale tests be reviewed and that JTF elements, along with interested offices of the AEC, develop for consideration by the DOD and the AEC a revised concept of public information practices based upon known realities.

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vide a 25 ft. road at an elevation of +8.5 ft. MLWS. Figures 28 and 29 show the construction percentages and completion dates of all expendable construction. Figure 30 shows the monthly construction progress of the over-all program.

2.6.4 ASSEMBLY AREA

In order to outfit barges that were to be used as Zero Stations, it was necessary to design and construct a barge slip with a traveling gantry crane which could be used for the construction of the barge superstructure as well as the final installation of the test devices. To complement this barge slip, the design and construction of various buildings and facilities was necessary so that critical components could be stored, assembled and moved onto the barges. This entire project, shown in Figure 31, was known as the Assembly Area, within which the following construction was accomplished.

1. Building 411. The purpose of this building was primarily for the assembly of the test devices. It was a one-story steel frame structure with roofing and siding of steel, 44'-0" x 83'-0" x 34'-9" high with a steel frame leanto 16'-3 3/4" x 83'-0" x 8'-9" high erected on concrete footings and floor slab. Interior partitions of wood frame provided rooms for layout, a latrine, instruments and assembly. The instrument and assembly rooms were vapor sealed. Within the assembly room was installed a 25-ton traveling bridge crane, high intensity lighting, and other necessary utilities. The assembly and instrument rooms were dehumidified.
2. Building 412. The purpose of this building was for the handling, storing, and working of high explosive materials. This was a one-story steel frame structure with steel siding and roofing, 25'-6" x 31'-6" x 18'-6" high with steel frame leanto 9'-6" x 25'-6" x 8'-0" high, erected on reinforced concrete footings and floor slab. The building was vapor sealed, and within it were installed a five-ton traveling bridge crane, work benches, and necessary utility outlets. Part of the wiring was explosion-proof, and a ground grid was furnished outside of the building to provide a positive grounding system. The building was dehumidified.
3. Building 413. This was a magazine for the storing of explosives. It was a reinforced concrete structure of one room 22'-0" x 22'-0" x 14'-4" high with an earth covering of 3 ft. and side berm protection. Explosion-proof wiring was used.
4. Building 414. This was a wood frame shed 8'-0" x 12'-0" with corrugated aluminum roofing and siding erected on a 4 in. thick concrete slab. It was used as a guard house.

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5. Building 415. The purpose of this building was for temporary storage of nuclear components. It was a reinforced concrete structure, 21'-4" x 25'-4" x 12'-6 1/2" average height surrounded by a sloping earth berm to the full height of the building and having diagonal wing walls for protection of the entrance.
6. Structure 419. This structure was the barge slip. It consisted of a sheet-steel pile enclosed earth-filled mole, 81'-8" wide by 86'-8" long to which were connected two creosoted pile finger piers, each 20'-0" x 132'-0" and separated 40 ft. to form the barge slip. Along the piers were laid the rails for the gantry crane, which had a capacity of 25 tons and a 37 ft. hook lift. Both sides of the slip as well as the slip proper were dredged to permit berthing of three barges at the same time.
7. In addition to the foregoing buildings, a number of 8-man tents were erected for temporary offices, working space and storage. Because the Assembly Area was designated as an "Exclusion Area", it was completely surrounded by a security fence. A salt water well was constructed within the area to augment the normal water supply in case of fire.

2.6.5 DECONTAMINATION

In December 1952, when the construction requirements for test and supporting facilities in the Eberiru-Rojoa area became firm, the radiation levels in that area, due to previous tests, were such as to require decontamination measures in order to preclude over-exposure of personnel. In the area of the Eberiru crater, shown in Figure 32 (March 1953), the radiation level at this time was 50 to 95 mr/hr, necessitating close Rad-Safe control over all personnel required to work there. The radiation level at Rojoa was such that men could not be based ashore, and therefore an LCU fitted out as a houseboat was used to quarter and subsist the personnel.

The most satisfactory method for decontamination of ground areas was the removal of all vegetation and the ground surface to a depth depending on the radiation level. Near the Eberiru crater as much as 12 inches of the earth was removed. The crater was filled and compacted with 77,490 cu. yds. of earth.

For the campsite on Rojoa, approximately 53,785 sq. yds. were cleared to a depth of about three inches, then approximately 24,775 sq. yds. were backfilled with uncontaminated coral to a depth of about two inches.

Due to having to quarter and subsist all personnel at Bikini Atoll afloat following BRAVO, it became necessary to provide a floating decontamination station for personal needs. This was accomplished by fitting out a 500-ton

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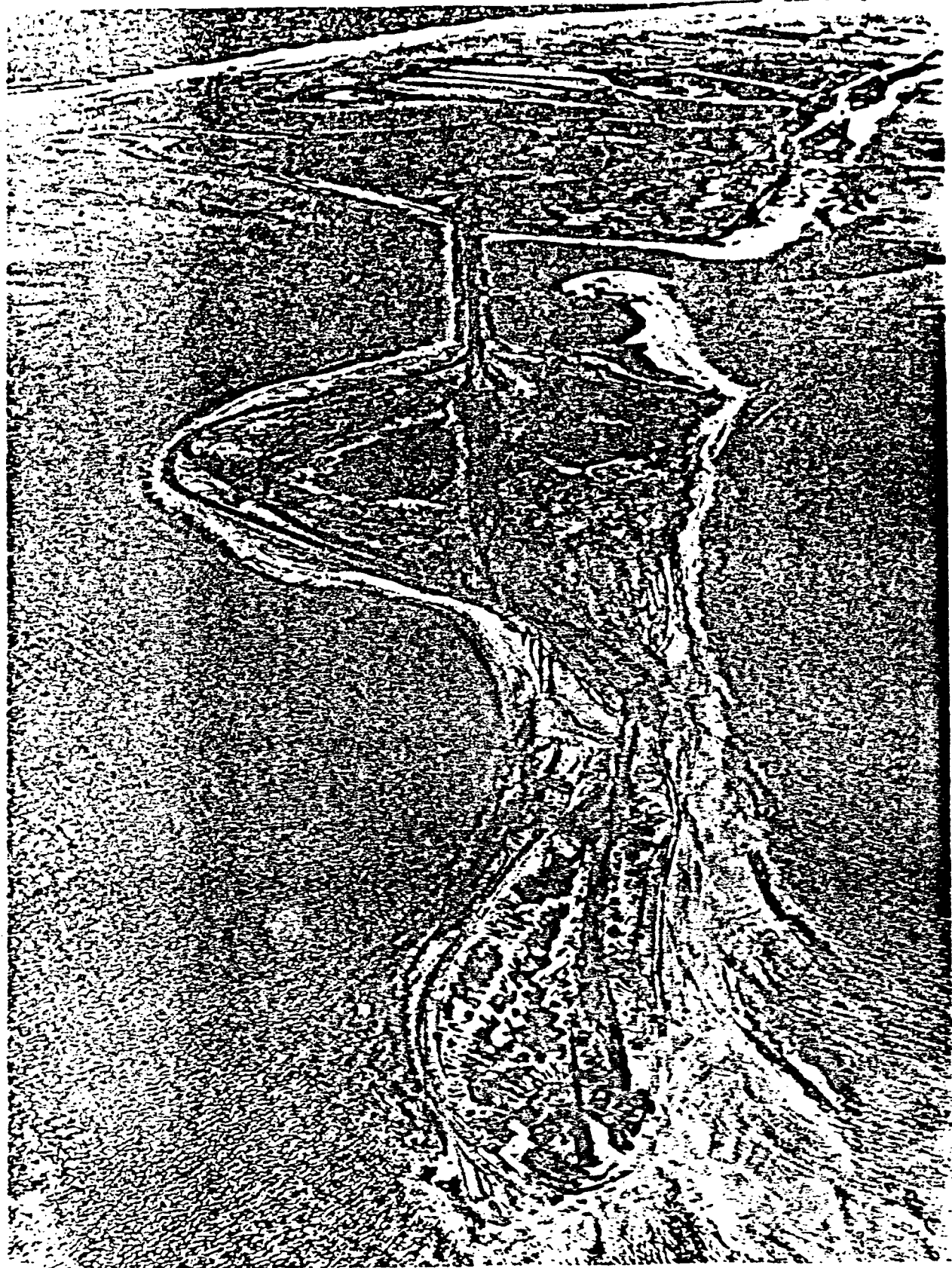
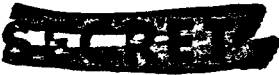


Figure 32. Crater on Eberiru Showing Fill Operations 10% Complete



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barge on which were installed a salt water shower system with necessary pump and fuel systems and two 8-man tents; one for a dressing room and stowage of clothing and the other for an office and radio-phone station.

In order to provide for continuous operations in the dock area at Eninman after contamination (as a result of the BRAVO event), the area was cleared of several inches of surface. All equipment required for operations at Bikini which had become contaminated to an extent precluding operation without overexposure was decontaminated by washing down until the level was reduced sufficiently to permit safe operation.

Airukiiji - Airukiraru islands airstrip, which was non-operational for eight days due to wave-deposited debris from the BRAVO shot, was made operational when radiation levels permitted TG 7.5 working parties to re-enter the area. The wave from UNION also put the airstrip out of commission but it was placed in operational condition within three days after the shot.

Rolling stock, equipment and personal effects were shipped from the Bikini area to Eniwetok for decontamination. The existing Rad-Safe facilities at Parry Island, however, were taxed beyond capacity, especially in regard to heavy equipment. It was therefore necessary to build an additional fenced-in wash-down area on Parry, which was approximately 150 ft. x 200 ft. containing a 50 ft. x 50 ft. concrete slab for water run off. Fresh and salt water lines were laid, and a boiler was installed to supply the necessary live steam to clean off engine and chassis grease. Salt water was used for washing down the contaminated equipment. TG 7.5 personnel decontaminated the equipment without delay to allow the various Task Groups to make preparations for an early return of their equipment to the Z.I.

CHAPTER 3. CONSTRUCTION EQUIPMENT

3.1 COMMENTS

In June 1952 the Field Manager requested the Contractor to prepare a report on probable facilities required on Bikini Atoll. This request resulted in a careful study of construction equipment and other long delivery items for the purpose of evaluating the capability of carrying on construction work at two widely separated sites. Since reinforced concrete construction is one of the major items in any operation, the requirements for large scale coral aggregate production equipment were finalized. Two rock crushing and screening plants were ordered and were delivered in March 1953. By April 1953, the scientific construction scope was well defined for both atolls. Islands and locations were selected for material stockpiles, crushing plants were placed in operation and concrete batching plants were set up. Coral aggregate quarries were located at four locations on Bikini Atoll and at three locations on Eniwetok Atoll. Two crushing plants were assigned to Bikini and one plant to Eniwetok; all three plants were in production in April 1953. Having this equipment available for an early start on this work was one of the major factors in meeting scheduled construction completion dates.

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A major Air Force building program was scheduled for Eniwetok Island, requiring a further review of construction equipment requirements. The asphalt paving equipment was in very poor condition. It had been acquired as used equipment in 1949 and had been subjected to a great deal of use in previous operations and required replacement. New equipment of the traveling type was purchased and was more adaptable to the various types of work at the PPG. A much lower capital investment was likewise involved.

Due to the increased number of camps and operational sites there was not enough equipment available to outfit adequately the construction crews. This was especially true of concrete placing equipment, cranes, trucks and earth moving equipment. This problem was largely overcome by careful planning of equipment usage for each construction phase of each structure with the aim of getting maximum utilization of equipment. This involved considerable movement of equipment between islands at each atoll in order to have it available when required. The work of the various crafts was scheduled in accordance with the equipment usage plan. Appendix B lists \$2,251,889.10 worth of equipment added for Operation CASTLE.

For the operation roll-up, a schedule of events was formulated as the heavy construction period drew to a close. This plan included the return of all unexpended equipment to Parry for overhauling, sandblasting, painting, and application of preservatives to all moving parts before being placed in storage. This was done in most instances.

Prior to the BRAVO event, reoccupation of Enyu and Eninman had been scheduled. After the BRAVO event, the salvaging of personal effects had high priority. The roll-up of equipment at these camps was somewhat retarded due to a bottleneck in interatoll transportation. All equipment not needed for the YANKEE test was removed from Bikini by 3 May. On 12 May, the LSD BELLE GROVE arrived at Parry with the last scheduled load from Bikini and the roll-up for that atoll was completed.

The roll-up for Eniwetok Atoll was completed by 20 May 1954. As of this date a substantial amount of equipment had been repaired, overhauled and mothballed. That which remained to be accomplished was the application of preservatives to vehicles, generators and marine craft. All marine craft remaining in wet storage will be kept in an operable condition and will be operated at least once weekly.

3.2 RECOMMENDATIONS

This Operation presented a very tight construction schedule which was further complicated by late simultaneous releases of many additional major items of work. However, serious delays in the construction schedule were averted by having sufficient numbers of suitable equipment on hand. This preparedness was due to early evaluation of equipment requirements and prompt procurement thereof. It is recommended that the Contractor adhere to this practice in the preparations for future operations.

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3.3 EQUIPMENT SUMMARY

All equipment added to existing equipment at the PPG and required for Operation CASTLE is listed in Appendix B. Not listed is a relatively insignificant amount of automotive equipment such as jeeps and crash trucks which was borrowed by TG 7.5 for the Operation.

CHAPTER 4. LOGISTICS AND SUPPORT

4.1 TRANS-PACIFIC

Material scheduled for transshipment to the PPG via water was delivered to the Naval Supply Center (NSC) in Oakland where it was manifested and held for loading aboard cargo vessels. The Western Sea Frontier allocated space aboard these vessels according to the amount of Contractor's material to be shipped. As a general rule, space was allocated on one cargo and one refrigerated ship per month. During the peak period, two cargo vessels per month were assigned. Records covering the transportation of materials included a U. S. Navy ship's manifest which was prepared by Naval agencies and then forwarded to the Contractor's home office. During the period from 1 January 1953 through 31 April 1954, 33,695.60 long tons of cargo were shipped by water. To meet deadline construction dates, priority assistance was furnished by the Defense Requirements Branch, AEC, Albuquerque. Additional assistance through telephone calls placed by the Defense Requirements Branch to vendors and manufacturers also resulted in the improvement of delivery dates.

In many instances, shipment by water had to be changed to air freight due to the urgency of the work involved. A priority permit was required for all air shipments. Excellent cooperation was had from Air Force Base personnel. A few temporary delays of air shipments from Travis Air Force Base occurred due to priority of Military materiel. During the period from 1 January 1953 to 30 April 1954, 603,205 lbs. were shipped via air freight.

Contractor's personnel were flown by MATS aircraft to the PPG from Travis to Eniwetok via Hickam Field, Honolulu and Kwajalein. At the end of the Operation the procedures were reversed and returnees were expeditiously processed.

4.2 ENIWETOK ATOLL

At Eniwetok Atoll, TG 7.5 operated and maintained a small craft pool comprised of LCUs, LCMs, DUKWs, tugs, water taxis, and barges. The facility provided for scheduled runs between the various island camps, non-scheduled runs to outlying islands and lagoon stations, unloading of ships, recovery of records and samples after shots, and evacuation of personnel and equipment. During the period of peak demand, the TG 7.5 boat pool was augmented by craft from the TG 7.3 boat pool. The surface craft employed

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APPENDIX A

FUNCTIONS ASSIGNED TO TASK GROUP 7.5

May 25, 1953
(Rev. 10/1/53)

1. General Responsibilities -

- a. Engineer and construct all base facilities at the Pacific Proving Ground necessary to support the Task Force and AEC and its contractors in the conduct of test operations.
- b. Engineer and construct all test structures required for experimental work during test operations.
- c. Maintain all base facilities at the Pacific Proving Ground except for the military communications facilities on Eniwetok Island and military communications facilities at Bikini Atoll.
- d. Operate, manage, and direct camp facilities and supporting facilities at the Proving Ground, to include the following:
 - (1) Provide subsistence, quarters, laundry, medical, recreational, and other camp services on all islands except Eniwetok, where these services are provided by Task Group 7.2. Blocks of housing will be assigned to Joint Task Force SEVEN Headquarters, TG 7.1, and TG 7.5, within which the respective groups may assign spaces according to their own wishes.
 - (2) Provide land transportation service on all islands on Eniwetok and Bikini except in those circumstances where the use of vehicles organic to military units is appropriate. Operate a motor pool on Parry and other islands as required, to include all vehicles assigned to TG 7.1 and 7.5. Maintain all vehicles assigned to these two groups, regardless of ownership.
 - (3) Between operational phases provide and operate boat pools at Eniwetok and Bikini to support operations and construction at these atolls and provide CTG 7.2 with AEC requirements for interatoll surface lift. During operational phases provide and operate boat pools and establish interatoll lift requirements in accordance with procedures to be mutually agreed upon with CJTF SEVEN.
 - (4) Between operational phases provide CTG 7.2 with AEC inter-island liaison airlift requirements to support construction and operations at Eniwetok and Bikini. Dispatch such aircraft in coordination with CTG 7.2. During operational phases provide the appropriate Task Group with Joint TG 7.1 and 7.5 liaison airlift requirements and participate in dispatching such aircraft in accordance with procedures approved by CJTF SEVEN.
 - (5) Operate all utilities on all islands, excepting the communications facilities on Eniwetok Island, the military radio communications facilities at Bikini Atoll, and the POL farm on Eniwetok Island.

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- (6) Provide warehousing and property accounting facilities for all materials and equipment shipped to the forward area for TG 7.5 and TG 7.1 if requested. These services include the receiving, issuing, distribution, warehousing, and return packing and shipping as indicated or required. Stateside it includes port of embarkation and debarkation receiving, overseas packing, and transshipment.
 - e. Provide for radiological safety of TG 7.1 and 7.5 personnel in the periods between operations.
 - f. Provide support services in the way of labor and materials to assist scientists and technicians in their test programs.
 - g. Be responsible for formulating and operating a comprehensive security program at the Pacific Proving Ground, to cover the AEC interest at that installation between operations and during operations to provide at the Pacific Proving Ground the security servicing for AEC, AEC contractor components, and DOD elements participating as part of TG 7.1, in coordination with the staff of JTF SEVEN and AEC, Washington.
 - h. Develop in coordination with JTF SEVEN and TG 7.1 detailed operational plans for critical phases of operations.
2. Specific Responsibilities -
- a. General - For the sake of brevity and avoidance of repetition in this document the various duties and responsibilities specified below are, for the various staff sections, responsibilities of an over all planning, administrative, and general supervisory nature. The detailed supervision, staffing, and execution of the various activities required to discharge the responsibilities are functions of the appropriate Task Units shown on the attached Organization Chart.
 - b. E-1
 - (1) Establish and administer policies concerning travel, work week, and other personnel administrative matters involving personnel assigned to TG 7.5.
 - (2) Prepare personnel for movement overseas, issue travel orders and identification cards, and make detailed arrangements for transportation to the forward area. Provide service in Honolulu to personnel of TGs 7.1 and 7.5 in expediting and assisting their movement to and from the forward area.
 - (3) Determine requirements for air and surface personnel in transportation for reporting to JTF SEVEN.
 - (4) Fulfill necessary requirements of JTF SEVEN, TG 7.1 and TG 7.5 for office and laboratory space and furniture; allocate space to TG 7.5 staff sections and Task Units as required.
 - (5) Administer and account for military funds allocated to TG 7.5 for construction and support for TG 7.1 or Department of Defense program.

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- (6) Organize, staff, and operate, in coordination with TG 7.1, a personnel reception unit at Eniwetok and Bikini to receive, billet, and orient personnel of TG 7.1 and 7.5, and to process them prior to their return to the U. S. Assignment of billets within assigned blocks of housing, however, will be performed by JTF SEVEN and TG 7.1 representatives, respectively.
 - (7) Provide postal service except on Eniwetok Island. Provide for reproduction and distribution of Task Group reports and documents.
 - (8) Assist E-3 in the preparation and execution of evacuation plans.
 - (9) Provide necessary recreational facilities for JTF SEVEN Headquarters, TG 7.1, and TG 7.5.
 - (10) Prepare administrative reports in coordination with other staff sections. Monitor the preparation and submission of periodic reports required by JTF SEVEN. Prepare Task Group historical and completion reports as required.
 - (11) Coordinate all arrangements for handling and billeting visitors to TG 7.5.

c. E-2

- (1) Secure and coordinate AEC personnel and military clearances of TG 7.5 personnel.
- (2) Establish a system to assure that all personnel resident at the Pacific Proving Ground are in possession of proper clearances for required access to limited and exclusion areas and/or classified information.
- (3) As required by CTG 7.1, approve correspondence channels for Restricted Data between Headquarters, TG 7.1, and DOD or other participating facilities upon determination of adequacy of security safeguards in effect at such facilities in accordance with Task Force and other AEC security standards and policies.
- (4) Maintain clearance status rosters of all Task Groups of JTF SEVEN having access to limited or exclusion areas.
- (5) Designate 7.5 personnel as "good security risks" and forward notices of such to CINCPAC in compliance with Serial 020.
- (6) For TG 7.1 personnel, other than those having "Q" clearances or "P" approvals, upon request of CTG 7.1, designate such persons as "good security risks". TG 7.1 will forward actual notices as such to CINCPAC in compliance with Serial 020.
- (7) Upon receipt from TG 7.1 of properly executed AEC visitor notifications (AEC Form 277) will notify AEC Resident Engineer (TWX or best method) of proposed visits of TG 7.1 personnel to the Pacific Proving Ground until assumption of operational controls by CJTF SEVEN.

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- (8) TG 7.1 will keep TG 7.5 informed of departures to the Pacific Proving Ground by forwarding one copy of travel orders on each TG 7.1 individual proceeding to the Pacific Proving Ground for notification to the State Department Passport Division. Notification of departure of TG 7.1 personnel from the forward area will also be forwarded to TG 7.5 for similar notification to the State Department of returns from the forward area.
- (9) In coordination with CJTF SEVEN and CTG 7.1, and based on classification of areas as established by the JTF Classification Officer, will designate the classified TG 7.1 and TG 7.5 areas at Eniwetok and Bikini Atolls, and will design access control and badge systems at the Pacific Proving Ground to include access controls to all operational islands and exclusion areas.
- (10) Provide TG 7.1 with policy material and operational detail to permit TG 7.1 to operate a program of security indoctrination for their personnel within the ZI, taking cognizance of CJTF policy on security indoctrination.
- (11) Provide security indoctrination for all TG 7.5 personnel and perform a similar function for TG 7.1 personnel at the forward area.
- (12) During the overseas phase of operations maintain liaison with other security agencies such as FBI, AEC Headquarters, SFOO, and JTF SEVEN relative to security violations and derogatory information involving personnel of TG 7.1 and 7.5 amounting to deviation from AEC security policies.
- (13) Secure JTF security departure statements for TG 7.1 and 7.5 personnel at time of their departure from the forward area following the completion of a test operation.
- (14) In coordination with interested Task Groups establish shipment security plans and courier plan, and recommend to CJTF the military guard requirements (including guard communications requirements) for TG 7.1 and TG 7.1 operations at the Pacific Proving Ground.
- (15) Conduct security surveys of AEC interests at the Pacific Proving Ground in coordination with SFOO.
- (16) Delineate responsibilities of the civilian guard force at the Pacific Proving Ground.
- (17) Evaluate sabotage potential at the Pacific Proving Ground.
- (18) Justify and initiate requests for construction of fences, special lighting, and other appropriate physical security safeguards at the Pacific Proving Ground and coordinate such requirements with CTG 7.1 and CJTF SEVEN. Subsequently monitor installation

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and operation of such physical security safeguards at the Pacific Proving Ground for conformance with AEC and Task Force security policies.

- (19) Provide security representation for TG 7.5 elements afloat and furnish personnel in security servicing capacity for elements of TG 7.1 afloat.
- (20) Maintain liaison with security personnel of Headquarters, JTF SEVEN, and other Task Groups to assure adequate coordination of matters of mutual interest.
- (21) Assist in the preparation and execution of security aspects of TG 7.1 documentary and technical photographic controls plans at the Pacific Proving Grounds.
- (22) Monitor the storage, handling, and destruction of classified materials and documents in accordance with AEC standards.
- (23) Function as Top Secret and Classified Reference Control Officer and as Top Secret authenticating official for SFOO-AEC interests at the Pacific Proving Ground.
- (24) Function as EFO Accountability Officer with responsibility for preparation of monthly SF materials balance report and for preparation of certificates of expenditures of SF materials during tests at the Pacific Proving Ground.
- (25) Notify CJTF SEVEN of the current TG 7.5 clearance (except Holmes & Narver) status and furnish CJTF SEVEN, after the operation, a clearance status report of all Holmes & Narver participants.
- (26) Prepare the security annex to TG 7.5 field and administrative orders and assist in the preparation of the security annex to TG 7.1's operation and administrative plans.
- (27) Assist other Task Groups of JTF SEVEN in all other security matters when so requested.

d. E-3

- (1) In coordination with TG 7.1 ascertain and submit TG 7.5 requirements for ships, boats, and aircraft to JTF SEVEN.
- (2) In coordination with TG 7.1 collect and analyze total requirements for housing and personnel transportation, submit requirements to JTF SEVEN and Task Groups as appropriate, and assist in solution of related problems as necessary.
- (3) Coordinate space utilization, including quarters, public spaces, warehouses, etc., to accommodate fluctuating requirements of various Task Groups and to assure most efficient utilization of available space.



- (4) Maintain liaison with other Task Groups in connection with requirements for the use of their facilities for test and operational purposes.
- (5) Prepare and supervise the execution of Task Group operation plans, orders, annexes, schedules of events, check-off lists, and evacuation and emergency plans.
- (6) Coordinate operations orders and annexes with TG 7.1 to insure the safety of operations in contaminated areas and the scheduling of recovery operations within the capabilities of available support personnel.
- (7) Establish and maintain at the forward area a readiness reporting system.
- (8) In coordination with TG 7.5 staff establish necessary procedures and accumulate appropriate information for analysis of the operation and planning for future operations.
- (9) Administer TG 7.5 interest in scheduling and dispatch of liaison planes and helicopters for intra-atoll transportation and aircraft for interatoll transportation in accordance with the operational system agreed upon with CJTF.
- (10) Administer scheduling and dispatching of the TG 7.5 boat pool, as supplemented by the TG 7.3 boat pool. Cooperate with other Task Groups in establishment of ferry schedules and in connection with the use of TG 7.5 craft for JTF SEVEN purposes.
- (11) Administer the dispatch and maintenance of TG 7.5 and 7.1 vehicles, including scheduling and operation of land transportation systems.
- (12) Function as clearing house for inter-Task Group problems related to services and facilities provided by AEC and AEC contractors.

e. E-4

- (1) Receive from JTF SEVEN, TG 7.1, 7.2, 7.3, and 7.4 operational and construction requirements and provide for facilities, equipment, and personnel to meet these requirements.
- (2) In coordination with JTF Liaison Officers expedite material and equipment of TG 7.5 (and, if requested, TG 7.1) from the port of embarkation to the forward area and return.
- (3) Continue the present system of accountability of property in the forward area procured by or for Task Groups 7.1 and 7.5 with AEC funds.
- (4) Determine TG 7.5 cargo requirements for air and surface transportation and submit monthly and special reports to JTF SEVEN covering TG 7.5 air and surface transportation.



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- (5) Assist if requested in the movement of material and equipment of TG 7.1 from the point of origin to the port of embarkation.
- (6) Obtain air priorities for all TG 7.5 material and equipment requiring overseas airlift and arrange with JTF for each such shipment.
- (7) Arrange for booking of cargo on available ships.
- (8) Maintain liaison offices at Travis and Hickam Air Force Bases and at the Naval Supply Center, Oakland, to assist as required or requested in the movement of TG 7.1 and 7.5 material, equipment, and personnel.
- (9) Offload TG 7.1 and 7.5 material and equipment at Eniwetok and Bikini Atolls and receive, warehouse, and distribute such material and equipment as requested to the location where it is to be used.
- (10) Provide necessary packing and documenting service for TG 7.1 and 7.5 material and equipment to be returned to the United States.
- (11) Prepare and distribute transportation, shipping, and marking instructions as required by the Task Force.
- (12) Prepare the supply, transportation, and property annexes of CTG 7.5 field and administrative orders.

f. E-5

- (1) Ascertain communication requirements (except technical requirements) from TG 7.1 and either provide these facilities or submit requirements as appropriate to JTF SEVEN.
- (2) Supervise installation, operation, and maintenance of the telephone system on all islands other than Eniwetok.
- (3) Supervise installation and maintenance of the interisland telephone and signal cable system, including the assignment of telephone cable pairs to meet JTF SEVEN and TG 7.1 requirements.
- (4) Supervise installation, operation, and maintenance of the boat pool radio system.
- (5) Supervise installation and maintenance of the point-to-point radio system servicing airstrips on all islands except Eniwetok and Bikini Airport.
- (6) Supervise operation and maintenance of the ZI terminal of the Los Alamos-Eniwetok RATT circuit.
- (7) Provide cryptographic system for use of CTG.7.5 and CTG 7.1 for the exchange of messages classified Top Secret, Restricted Data.

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- (8) Supervise installation and maintenance of paging and intercommunications systems on all islands other than Eniwetok Island.
- (9) Provide a Comcenter facility on Parry Island to receive electrically all incoming teletype messages (except Top Secret and Restricted Data) for TG 7.5 and TG 7.1.
- (10) Supervise the publication and distribution of telephone directories for both Bikini and Eniwetok Atolls.
- (11) Supervise the operation of motion picture facilities at Bikini and Eniwetok Atolls (except Eniwetok Island).
- (12) Provide teletypewriter operators to support TG 7.1 Eniwetok-Bikini RATT circuit.

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